**Interesting Things I Learned at NP'08**
**and**
**a Discussion with McGinnis**

**NP'08**

1. According to Kuno, COMET has *not* calculated the rates from neutrons, antiprotons, or muons above 76 MeV/c during the beam flash. They assume that since they have a curved transport line between the stopping target and the detector these rates are not a serious problem. There has been very little progress shown since the earliest MCs and many key plots are parameterized resolutions.

2. The operating budget for J-PARC is vaporware. The first year, a \$50M = 50 Oku¥ budget comes out of construction and there is no operating budget after that. There was a testy exchange about this issue between the J-PARC director and what I took to be a minister during the symposium. The physicist-speakers took pains to point out they knew they needed to prioritize and choose carefully.

**Beam Issues for Mu2E**

One can argue with any of the points below. My point is that all of these issues need to be nailed down at the CDR level. I strongly believe:

- We should approach the FNAL Accelerator Physics Center through Roger Dixon, AD head, and get Vladimir Shiltsev and the APC on-board, and we should do this yesterday.

- get the APC to assign people to at least work out what resources are needed to attack these problems.

- then get them in conjunction with us to solve these problems at the CDR level so we can make sensible cost estimates. I do not want us to get into an argument about whether it makes sense to build a new ring now or later – first we need to know what the experiment as proposed costs. If we ask for a new ring first, then people will assign the whole cost to us instead of thinking of it as part of a Project X program.

Here are some issues Dave McGinnis raised:

1. self-bunching in the Accumulator coasting beam was discussed at the AAC review; need RF feedback, nor has anyone dealt with the electron cloud.

2. slow resonant extraction we used in the LOI was 98% efficient with a $(\Delta p)/p$ of 1.5%. The lore is that 99.3% efficient yields about 1 watt/meter diffuse loss, which then heats up all magnets and beam devices so much no one can work on them. This is data from the Booster, assumed translates to the Debuncher.

Obviously we must determine how much beam is lost and what that means in our extraction scheme.

3. have we studied transverse instabilities? Are wide-band dampers required?
4. we need to understand longitudinal impedances and figure out exactly how much RF is needed
5. there is not enough shielding in the debuncher and putting enough shielding in will cause the tunnel to collapse. This is from the "1 hr accident condition" where FNAL routinely assumes beam is lost for 1 hr without anyone noticing. Therefore one needs a beam protection system of some sort.
6. both the Acc and the Debuncher need new RF systems
7. and new kickers
8. and a new extraction system in the Debuncher

None of this was taken as fatal — but the point is that somewhere between the proposal and CDR level we need this worked out to provide a sensible cost estimate. My private opinion is that whatever is worked out will be believed *iff* it comes out of the APC and that if we do it it will be dismissed.

We also had a long discussion about building a new ring rather than dealing with these problems. I argued, with some success, that first we needed to do the experiment at the MECO level to determine what was needed in the Project X era, and that the Project X schedule was much more uncertain than Dave was assuming. Therefore proceeding with upgrades of order $100M to do a first-phase was not crazy. But this is a matter of opinion and priority-setting. Dave did agree that the correct course was to get APC resources to do these calculations so that AD would believe the calculations and a realistic scope and cost and therefore schedule could be presented to the PAC.